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FORCED AIR WALL HEATER

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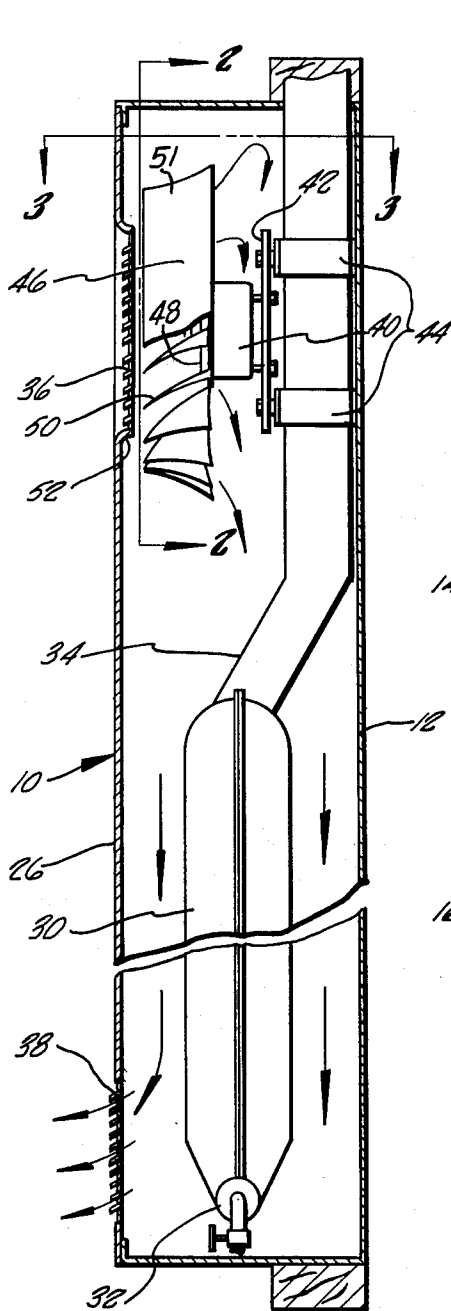


FIG. 1.

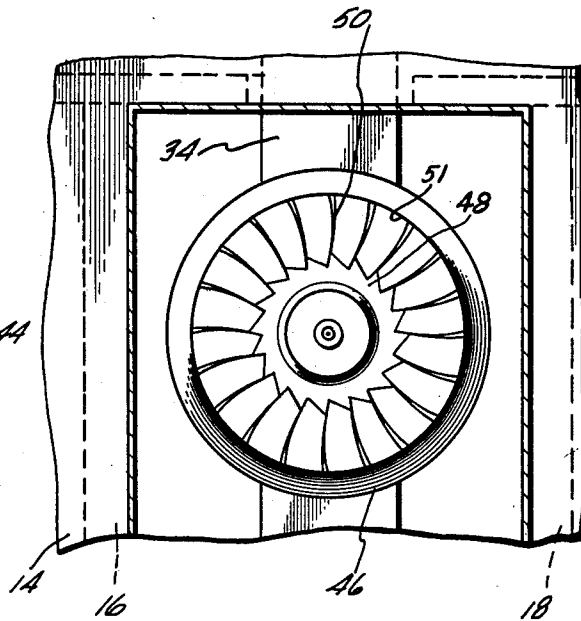


FIG. 2.

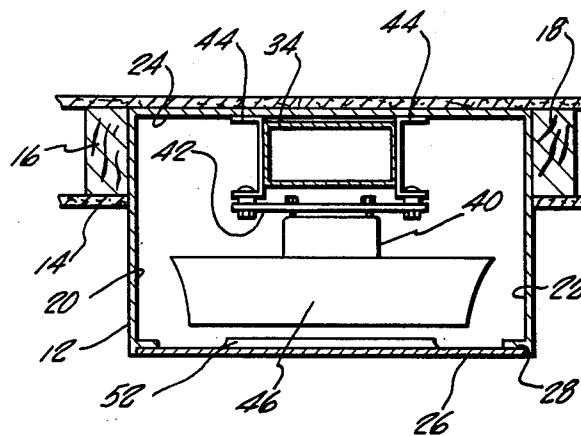


FIG. 3.

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FORCED AIR WALL HEATER

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This invention relates to wall heaters and, more particularly, is concerned with a forced air circulation system for use in combination with a wall heater.

Gas-fired wall heaters have come into prominent use in recent years because they are relatively inexpensive to build and simple to install. They are economical in operation and provide a fast means of heating, an advantage in climates where the nights are cool but the days are warm. The usual wall heater comprises a shallow chamber or shell at least partially set into a wall between wall studs set on standard sixteen inch centers. A radiator or combustion chamber is mounted in the chamber, usually with space on all sides. Gaseous fuel is burned in the radiator which heats a current of air flowing through the chamber. The current of air may be moved by natural convection from a grill or opening at the bottom of the chamber and passing upwardly around the radiator and out through an opening in the upper portion of the chamber. Where larger heat capacity is required, forced air circulation rather than convection circulation is required. It is preferable for most efficient heating of a room that air be taken in at the top of the chamber and forced down over the radiator and pushed out near the bottom of the chamber. The combustion products from the interior of the radiator are discharged into a flue extending above the chamber and usually enclosed in the wall.

It has been the practice to utilize a centrifugal blower to provide air circulation through the heater. Such a blower is efficient in moving a fairly large volume of air at low static pressures. At the same time, it generates much less noise than propeller type fans for example. However, because a centrifugal fan requires its own housing, in the shape of a scroll, it is bulky in shape and therefore difficult to incorporate into the shallow enclosure of a wall heater. One arrangement heretofore employed has been to extend the heater box substantially to the ceiling leaving a space above the radiator in which a pair of small centrifugal blower units could be mounted on either side of the flue. A single motor has been used for these two units, the motor being positioned in front of the flue and between the two blower units. The blower units open downwardly to push air down past the radiator. Air is ducted into the two fan units from a grill in the upper front portion of the wall heater housing.

Such an arrangement has a number of disadvantages. First, the dual blower units are expensive. Two complete blower units, each with its own impeller and housing, are required. Second, the motor being mounted directly in front of the flue is subject to overheating. There is no satisfactory way of effectively cooling the motor since the air discharged from the blowers is directed downwardly and does not circulate past the motor. The only cooling is by air drawn in to the chamber on the suction side of the blowers. Third, the double blower with intermediate motor is difficult to assemble and mount within the confined spaces provided between the flue and the outer enclosure of the heater.

The present invention is directed to a forced air wall heater having an improved blower arrangement which is much simpler to construct and mount in the wall heater, which provides adequate cooling for the motor and which is significantly less expensive to manufacture. At the

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same time, the blower arrangement provides high blower efficiency and extremely quiet operation.

In brief, these advantages of the present invention are achieved in a wall heater including a metal enclosure arranged to fit between a pair of wall studs, the enclosure having a radiator positioned therein and a gas burner for heating the radiator. A flue extends from the radiator out through the top of the enclosure. The blower includes a motor positioned between the flue and the front wall of the enclosure. The motor is supported by a bracket extending from the walls of the enclosure with the shaft of the motor being perpendicular to the front and back walls. A centrifugal fan element is mounted on the shaft in front of the motor. The fan element has a rotating disc to which are secured a plurality of curved vanes for forcing air rearwardly and outwardly from the shaft in all directions. The front of the enclosure has an opening opposite the end of the motor shaft through which air is drawn in by the fan. Part of the air is then directed upwardly to the top and back down over the motor by the enclosure to cool the motor.

For a more complete understanding of the invention, reference should be made to the accompanying drawings, wherein:

FIGURE 1 is a side elevational view in section showing the wall heater;

FIGURE 2 is a partial view of a front elevation in section showing the blower element; and

FIGURE 3 is a top view in section taken on the line 3-3 of FIGURE 1.

Referring to the drawings in detail, the numeral 10 indicates generally a wall heater having an elongated sheet metal box or jacket 12 mounted in a wall 14 between studs 16 and 18. The wall heater may extend substantially from the floor to the ceiling, the box 12 including side walls 20 and 22, a back wall 24 and a front wall 26. The side and top walls are preferably formed with a lip or shoulder 28 against which the front wall 26 is removably secured.

A hollow sheet metal radiator or combustion chamber 30 is disposed centrally within the jacket so that there is an annular space around its sides, front and back through which heated air can pass. The radiator is heated on the inside by a rise in gases of combustion from a gas burner 32 located at the bottom of the radiator. The products of combustion are directed out of the top of the radiator through a flue 34 which extends upwardly along the back wall 24 of the jacket 12. The flue passes out through the top of the wall heater and discharges to a flue enclosed in the wall above the heater.

The present invention provides a novel arrangement by which air is drawn in through an opening 36 and directed downwardly over the radiator 30 and discharged out through a lower grill 38. The main circulation of air is indicated by the arrows in FIGURE 1. The blower unit utilizes the walls of the jacket 12 effectively as the shroud for the blower.

The blower assembly includes an electric motor 40. The motor 40 is secured at one end to a back mounting plate 42 with the axis of rotation of the motor 40 being perpendicular to the back plate. The back plate 42, in turn, is supported by means of four channel-shaped brackets 44 which are spot welded or otherwise secured to the back wall 24 of the jacket 12. The brackets 44 are arranged in pairs with one below the other on each side of the flue 34. The back plate 42 is secured at each corner to one of the channel brackets, the back plate being secured to the channel mounting brackets by rubber grommets or similar resilient mounting means for absorbing vibration. The back plate 42 acts as a radiant heat shield between the motor 40 and the flue 34.

The motor 40 drives a centrifugal fan member 46. The

fan is of a type which draws air in at its center and pushes it rearwardly and outwardly by centrifugal action. In particular, the fan member 46 includes a rotating disc 48 mounted on the shaft of the motor 40. A plurality of vanes are secured to the front of the disc 48, the vanes 50 being curved outwardly in the manner shown in FIGURE 2. An outer shroud 51 may be provided secured to the outer tips of the vanes.

The opening 32 in the front wall 26 of the jacket 12 is arranged with its edge curved inwardly as indicated at 52. The curved edge 52 extends inwardly towards the fan member 46 and is closely spaced from the vanes 50. A screen or grill is provided across the opening 36 to prevent foreign objects from entering the fan.

In operation, the fan element 46 is rotated by the motor 40 and by centrifugal action forces air rearwardly and outwardly from the vanes 50. The air directed upwardly within the jacket is deflected by the top of the jacket down behind the fan element, providing a cooling flow of air across the motor 40. All the air is ultimately directed by the walls of the jacket 12 downwardly around the radiator 30 and out the lower grill 38. Unlike a propeller type fan which chops the air, the centrifugal fan member 46 pushes the air rearwardly and outwardly by centrifugal force producing a substantially noiseless blower. Unlike the usual centrifugal fan which requires a closely spaced shroud, the arrangement of the present invention requires no fixed shroud other than the surrounding jacket of the wall heater together with the back disc of the fan member itself. By the arrangement of the present invention, the motor, although located within the jacket of the wall heater, operates at a relatively low temperature because of the cooling effect of the air forced across it and by action of the radiation shield formed by the mounting plate.

What is claimed is:

1. A forced air wall furnace comprising a metal enclosure providing a pair of side walls spaced to fit between standard wall studs and front and back walls more closely spaced than the side walls, the enclosure having upper and lower front openings, a heat exchanger mounted vertically within the enclosure, a flue duct extending from the heat exchanger within the enclosure through the top of the enclosure, and fan means for drawing air in through the upper front opening of the enclosure, moving the air downwardly over the heat exchanger and discharging the air at the lower front of the enclosure, said fan means including an electric motor, mounting brackets secured to the back wall on either side of the flue, a radiation shield supported by the brackets and extending in front of the flue, the motor being secured to the radiation shield in front of the flue with the rotary axis of the motor extending normal to the back wall of the enclosure, and a centrifugal fan element including a disc mounted on the motor shaft, and a plurality of curved blades mounted on

the disc for driving air rearwardly and outwardly as the fan element is rotated, the edge of the upper front opening being curved inwardly to direct air to the center of the fan element.

2. A forced air wall furnace comprising a metal enclosure, the enclosure having upper and lower openings for circulation of air through the enclosure, the upper opening being in the front wall of the enclosure, a heat exchanger mounted vertically within the enclosure, a flue duct extending from the heat exchanger within the enclosure through the top of the enclosure, and fan means for drawing air in through the upper front opening of the enclosure, moving the air downwardly over the heat exchanger and discharging the air at the lower opening of the enclosure, said fan means including an electric motor, mounting brackets secured to the back wall on either side of the flue, a radiation shield supported by the brackets and extending in front of the flue, the motor being secured to the radiation shield in front of the flue with the rotary axis of the motor extending normal to the back wall of the enclosure, and a centrifugal fan element including a disc mounted on the motor shaft, and a plurality of curved blades mounted on the disc for driving air rearwardly and outwardly as the fan element is rotated, the edge of the opening being curved inwardly to direct air to the center of the fan element.

3. A forced air wall furnace comprising an outer enclosure having openings adjacent the top and the bottom of the enclosure, a heat exchanger mounted vertically within the enclosure, a flue duct extending from the heat exchanger through the top of the enclosure, and fan means for drawing air in through the upper opening of the enclosure, moving the air downwardly over the heat exchanger and discharging the air at the lower opening of the enclosure, said fan means including an electrical motor, a radiation shield extending in front of the flue, means for supporting the radiation shield and the motor from the enclosure with the rotary axis of the motor extending toward the upper opening, the radiation shield being positioned between the motor and the flue, and a centrifugal fan element mounted on the motor shaft and rotating immediately behind the upper opening within the enclosure for drawing air in through the opening and driving air rearwardly and radially outwardly as the fan element is rotated.

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